

The investigation of the Baton Rouge outbreak provides a model of procedures recommended by the International Association of Milk and Food Sanitarians.

An Outbreak of Gastroenteritis in a Louisiana School

J. D. MARTIN, M.D., ROSE MARY MARTINE, B.S., C. T. CARAWAY, D.V.M., and J. D. ORGERON, M.P.H.

ON October 12, 1956, the Louisiana State Department of Health and the East Baton Rouge Parish Health Unit were alerted to an outbreak of "food poisoning" among the students of a Baton Rouge high school by a radio announcer broadcasting a night football game between the school and a school near Lake Charles.

Health authorities in Lake Charles and the supervisor of the Baton Rouge high school cafeteria were contacted immediately. The director of the Calcasieu Parish Health Unit, after investigation, reported that the students were being hospitalized in Lake Charles and Sulphur, La., that the attending physicians were of the opinion that the illness was food poisoning, and that some of the students said that they had become ill before leaving Baton Rouge. The supervisor of the cafeteria stated that a number of students became ill Friday morning, but that she and the school principal thought they had a virus infection and so did not report the occurrence to the Parish health unit. She also stated that none of the foods from the Thursday menu were available for samples and that all leftovers, as well as the cans and their labels, were destroyed.

Determining Origin

Saturday morning, the staff of the East Baton Rouge Parish Health Unit, headed by

Dr. David E. Brown, and the epidemiology team of the Louisiana State Department of Health began their investigation.

It was determined that most of the affected persons had onsets during Thursday night and Friday, suggesting a common source of illness on Wednesday or Thursday, October 10 or 11. The most likely common source was one of the noon meals served at the school cafeteria. A list of all persons preparing and handling food in the school cafeteria on Wednesday and Thursday and copies of the menus for these days were obtained.

A sanitation survey was made of the entire school plant as well as the food-handling area. Particular efforts were made to find evidence of cross connection or back siphonage in the water distribution system of the school. Water from the school is supplied by the Baton Rouge water works. A service line to the school issues from a 17-inch main. Water pressure is high and does not fluctuate. The water works company's records showed, moreover, that it had

The authors are all with the Louisiana State Department of Health, where Dr. Martin serves as chief, and Miss Martine, nurse epidemiologist, of the epidemiology section. Dr. Caraway is a veterinary epidemiologist, and Mr. Orgeron, a sanitarian epidemiologist. The department's division of laboratories, directed by Dr. George H. Hauser, assisted in the study.

not had a service call from the school for several months nor had the water been cut off in that area for some time. The school authorities affirmed that there had been no plumbing or repair work at the school during the current term. Eight samples of water collected at different points on the first and second floors of the school building were reported negative for coliform organisms. Portions of the foods in stock were collected and submitted to the State department of health laboratory for bacteriological and toxicological studies.

Monday morning, October 15, questionnaires were distributed to the students and faculty at school with the request that they be completed and returned as quickly as possible. These questionnaires were designed to gather information of epidemiological significance. The support and help of the principal permitted completion of this task with ease by early afternoon.

The public health nurses contacted the food handlers and a number of the students Monday morning to obtain stool specimens for study. These were submitted to the State department of health laboratory to be studied for organisms of the food poisoning types.

A total of 1,105 questionnaires were completed and returned by 35 members of the

faculty and 1,070 students. The assistant principal advised us that 121 students were absent on this Monday compared with 95 on the preceding Monday. Two hundred sixteen persons did not eat any food in the school cafeteria on either Wednesday or Thursday, 16 drank only milk and 873 ate one or more of the items on the menu other than milk and in many instances including milk.

Of the 216 who did not eat in the cafeteria, 21 (9.6 percent) became ill between October 11 and October 14, with symptoms of gastroenteritis; 2 (12.5 percent) of the 16 who drank only milk had similar symptoms while 453 (51.8 percent) of the 873 who ate in the cafeteria had symptoms of gastroenteritis. Only 58 of 998 persons ate elsewhere with friends who were also made sick. Authorities of nearby schools revealed no unusual absenteeism. These findings indicated that the cause of the illness was associated with the school cafeteria.

During the study period, 83 persons were sick enough to see a doctor and 40 had to be hospitalized. The principal manifestations were nausea in 342 cases (78.8 percent), weakness in 285 (66.9 percent), vomiting in 194 (46.3 percent), fever in 189 (44.5 percent), diarrhea in 179 (42.5 percent), chilly sensations in 153 (36.5 percent), rigors in 36 (8.6 percent), and other

Table 1. Attack rates by category of food eaten in the cafeteria of a Baton Rouge high school, Oct. 10 and 11, 1956

Noon meal	Persons eating food item				Persons not eating food item			
	Total	Ill	Well	Attack rate	Total	Ill	Well	Attack rate
<i>Oct. 10, 1956</i>								
Meat loaf	726	408	318	56.2	102	24	78	23.5
Potatoes	679	367	312	54.0	149	65	84	43.6
Carrot salad	388	244	144	62.9	440	188	252	42.7
Apple pie	728	381	347	52.3	100	51	49	51.0
Bread	732	384	348	52.5	96	48	48	50.0
Milk	786	406	380	51.7	42	26	16	61.9
<i>Oct. 11, 1956</i>								
Pork and gravy	711	409	302	57.5	97	23	74	23.7
Coleslaw	353	229	124	64.9	445	203	242	45.6
Green beans	509	303	206	59.5	299	129	170	43.1
Rice	701	395	306	56.3	107	37	70	34.6
Cake and chocolate pudding	687	376	311	54.7	121	56	65	46.3
Bread	712	386	326	54.2	96	46	50	47.9
Milk	775	413	362	53.3	33	19	14	57.6

Table 2. Attack rates by combination of foods eaten in the cafeteria of a Baton Rouge high school, Oct. 10 and 11, 1956

Food	Persons eating food item			
	Total	Ill	Well	Attack rate
Meat loaf and/or pork and gravy-----	804	444	360	55.2
Meat loaf, no pork and gravy-----	97	37	60	38.1
Pork and gravy, no meat loaf-----	81	37	44	45.7
No meat loaf, no pork and gravy-----	69	9	60	13.0
Carrot salad, no meat loaf and no pork and gravy-----	21	4	17	19.0
Coleslaw, no meat loaf and no pork and gravy-----	11	0	11	0
No carrot salad, coleslaw, nor meat-----	46	5	41	10.9
Carrot salad and/or coleslaw, and both meats-----	354	237	117	66.9
Both meats but no carrot salad nor coleslaw-----	272	133	139	48.9
Carrot salad or coleslaw but no meat-----	22	4	18	18.2

symptoms in 8 (1.8 percent). Of those affected, 29.2 percent were sick less than 1 day, 47.9 percent more than 1 day and less than 2 days, 16 percent more than 2 and less than 3 days, and 6.9 percent more than 3 days. As nearly as we can determine, the incubation period was 32 to 72 hours.

Attack Rates

Attack rates were calculated for the different foods eaten (tables 1 and 2). These rates suggested that some persons became ill from food eaten Wednesday and others from food eaten Thursday. Investigation revealed that the meat loaf served on Wednesday was prepared from fresh meat and canned pork and gravy. Canned pork and gravy from the same company, but not leftovers, was served on Thursday. The attack rates strongly suggested that the meat loaf, the pork and gravy, the carrot salad, the coleslaw, or all of these, may have been the offending food.

Analysis shows that the attack rate for those who ate meat loaf on Wednesday and pork and gravy on Thursday are very similar (56.2 percent and 57.5 percent). There is also a close correlation between attack rates of those persons who did not eat these foods (23.5 percent and 23.7 percent). The difference in attack rates is even more pronounced when a tabulation is made of those persons who ate either or both meat loaf and pork and gravy. About 55 percent of such persons became ill, whereas only 13 percent of those who ate neither food

became ill. By the development of other rates, we were able to exclude the salads as probable offending foods. The attack rate for those who had either the carrot or coleslaw salad, but neither meat dish, was 18.2 percent as compared with an attack rate of 48.9 percent for those persons who had both meats, but neither salad. The significance of these differences was tested and it was found that this difference would occur only once in a million times by chance alone.

We have now established that those persons who ate either or both meat loaf and pork and gravy in the school cafeteria on Wednesday or Thursday and became ill did so in a significantly greater number than those who did not eat those meats in the school cafeteria on the 2 days.

Since leftovers of the suspected foods were not available, similar foods of the same manufacturer's lot number were collected and tested by cultural methods, animal feeding, and by serving to human volunteers. No organisms were cultured from these foods and none of the test animals or test humans became ill. This suggests the probability of these foods being inoculated with a pathogenic agent or a toxic substance after opening of the can. Investigation failed to reveal any likelihood of contamination with an insecticide, rodenticide, or other chemical. No pathogenic agent was identified in any of the stool specimens submitted by each of the food handlers and a number of students.

Two persons prepared and two different persons served the meat loaf on Wednesday. Thursday, the cans of pork and gravy were

opened by 2 persons, cooked by 1 person, and served by 2 people. One of the persons who opened the cans of pork and gravy cooked this food on Thursday; she is also 1 of the 2 who prepared and cooked the meat loaf on Wednesday. One of the two persons who served the pork and gravy on Thursday also served the meat loaf on Wednesday. If the meat loaf and the pork and gravy were contaminated after opening of the cans of pork and gravy, it seems likely that one of these two people inoculated the pork and gravy, and most probably it was the person who prepared and cooked the meat loaf and the pork and gravy. This is a supposition, not an established fact, however, as none of the usual food poisoning organisms were cultured from the persons who were ill or from the food handlers. This might be accounted for, however, by the failure to suspect the saprophytic organisms such as *Escherichia coli* or *Bacillus proteus* as a cause of the outbreak and to do the studies necessary for identifying these organisms. The possibility of a virus being the offending organism must also be considered as virus isolation studies were not performed. Also, the stool specimens submitted may not have been from the person submitting the specimen, especially if that person had recently been ill of a diarrheal disease and was afraid of being incriminated. Unfortunately, dyed lycopodium spores were not given to the suspected food handlers to allow identification of the stool specimens submitted. As the stool specimens submitted are subject to question, so is the illness history of the food handlers.

On a return visit to the school cafeteria, several kitchen workers were questioned. Evidence gathered suggested that some foods are being held over from one day to the next and served. On October 17, 1956, approximately 50 pounds of pork and gravy were found. This had just been removed from the freezer and was being discarded in the garbage. We were not able to determine whether this batch of pork and gravy was part of that which was served on Thursday. Samples were collected and submitted to the laboratory for study. No food poisoning organisms were isolated.

Summary and Recommendations

In summary, 51.8 percent of those persons who had their noon meal in a high school cafeteria in Baton Rouge on either or both Wednesday and Thursday, October 10 and 11, 1956, became ill with gastroenteritis after an incubation period of approximately 32 to 72 hours. Presumably the offending foods were meat loaf (containing pork and gravy) and pork and gravy. How these foodstuffs became contaminated and the identity of the infective agent was never established.

The following recommendations are the result of the investigation:

- Any disease occurrence of unusual magnitude or severity, regardless of what is thought to be the cause, should immediately be reported to the health officer having jurisdiction.

- When food is suspected as the vehicle of infection, every effort should be made to secure representative samples of the suspected food. When available, samples should be taken from the leftovers on plates of those affected as well as from the bulk food and submitted to the laboratory for cultural and toxico-chemical studies.

- Specimens of the vomitus and stools of patients suspected of being ill from ingestion of a suspected food should be collected and submitted to the laboratory for isolation of food poisoning or food infection micro-organisms or of a toxic substance.

- We should broaden our concept of food poisoning to include food infection by other agents which we have long believed to be saprophytic, but which recent investigations have demonstrated or suggested to be the causative agents of gastroenteritis.

- In addition to the usual sanitary inspection of plant and equipment we should concentrate our educational and investigational efforts on food-handling practices so as to establish and maintain safe methods of operation.

- The person responsible for the operation of a food-handling establishment should be taught the importance of a daily investigation of the health status of each of his employees and should be expected to exclude from work any individual who is sick or who has a discernible skin infection.